

TRU Transportation Product Line Summary

The Nuclear Regulatory Commission (NRC) has imposed a flammable (i.e. hydrogen) gas concentration limit on transuranic (TRU) waste transported using TRUPACT-II to minimize the potential for loss of containment during transport. This limit is set at the lower explosive limit (LEL) of 5% by volume for hydrogen in air. Accident scenarios and resulting safety analyses, developed as part of the TRUPACT-II Safety Analysis Report for Packaging (SARP), requires that this limit be complied with for a period of 60 days. TRUPACT-II SARP worst-case calculations and the current approach for demonstrating compliance with this requirement have resulted in approximately 35% of the waste stored at the INEEL, RFETS, and LANL and a significantly greater fraction at the SRS not being transportable using TRUPACT-II. Two options currently exist to address these rejected drums; gas generation testing as described in the TRUPACT-II SARP and waste form modification via repackaging and/or treatment. Given the extent of the problem and the cost associated with the two current options, more cost effective and efficient alternatives are needed.

The Mixed Waste Focus Area (MWFA) in conjunction with the National TRU Program (NTP) has initiated several activities specifically to address the hydrogen gas problem and to expand the TRUPACT-II waste envelope. Hydrogen gas build-up in TRU waste is the result of radiolysis of hydrogenous materials. The NRC's concern is hydrogen build-up and the potential for an explosion during transport. A waste's potential to generate gas due to radiolysis is characterized by a parameter called a "G" value (the number of molecules of gas generated per 100 eV of energy deposited). These activities will ultimately lead to new, less conservative TRUPACT-II worst-case calculations for demonstrating compliance with the requirement not to exceed 5% hydrogen during the 60-day shipping accident scenario. This is an alternative to the worst-case calculational approach for demonstrating compliance with the 5% hydrogen requirement, and a potential method of reducing the hydrogen concentration within the waste package or TRUPACT-II.

Activities currently funded by the MWFA and the NTP are designed to:

- determine hydrogen "G" values that are more representative of actual TRU waste
- develop an alternate method based on drum headspace measurements for demonstrating compliance with the TRUPACT-II hydrogen gas generation requirement
- evaluate hydrogen getter materials as a way of reducing hydrogen gas build-up within the TRUPACT-II.

It is estimated that these programs will provide transportation relief for approximately 90% of the current TRUPACT-II hydrogen gas related drum rejections at the INEEL, LANL, and RFETS. It is estimated that these programs will result in a potential cost savings of ~\$80M. The amount of relief anticipated for the higher Curie loading Pu-238 waste stored at the SRS has not been estimated due to a lack of inventory assay data. However, if these programs in conjunction with a simple repackaging process are successful, there could be a potential cost savings of ~\$600M.